TETRAZYGIA PARALONGICOLLIS (MICONIEAE: MELASTOMATACEAE), A NEW SPECIES FROM THE SIERRA DE BAORUCO AND SIERRA MARTIN GARCIA, DOMINICAN REPUBLIC

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ABSTRACT

Tetrazygia paralongicollis, a new species from the Sierra de Baoruco and Sierra Martin Garcia of the Dominican Republic, is described. This species occurs in pine forests and moist montane forests from 720–860 m, and is compared with its purported closest relatives: *T. longicollis* and *T. elaeagnoides*.

RESUMEN

Se describe **Tetrazygia paralongicollis,** una nueva especie de la Sierra de Baoruco y de la Sierra Martin Garcia de la República Dominicana. Este taxon ocurre en bosques de pino y bosques montanos húmedos entre los 720–860 m de altitud, y se compara con sus presuntos parientes más cercanos: *T. longicollis* y *T. elaeagnoides*.

KEY WORDS: Hispaniola, Dominican Republic, Melastomataceae, Miconieae, *Tetrazygia*

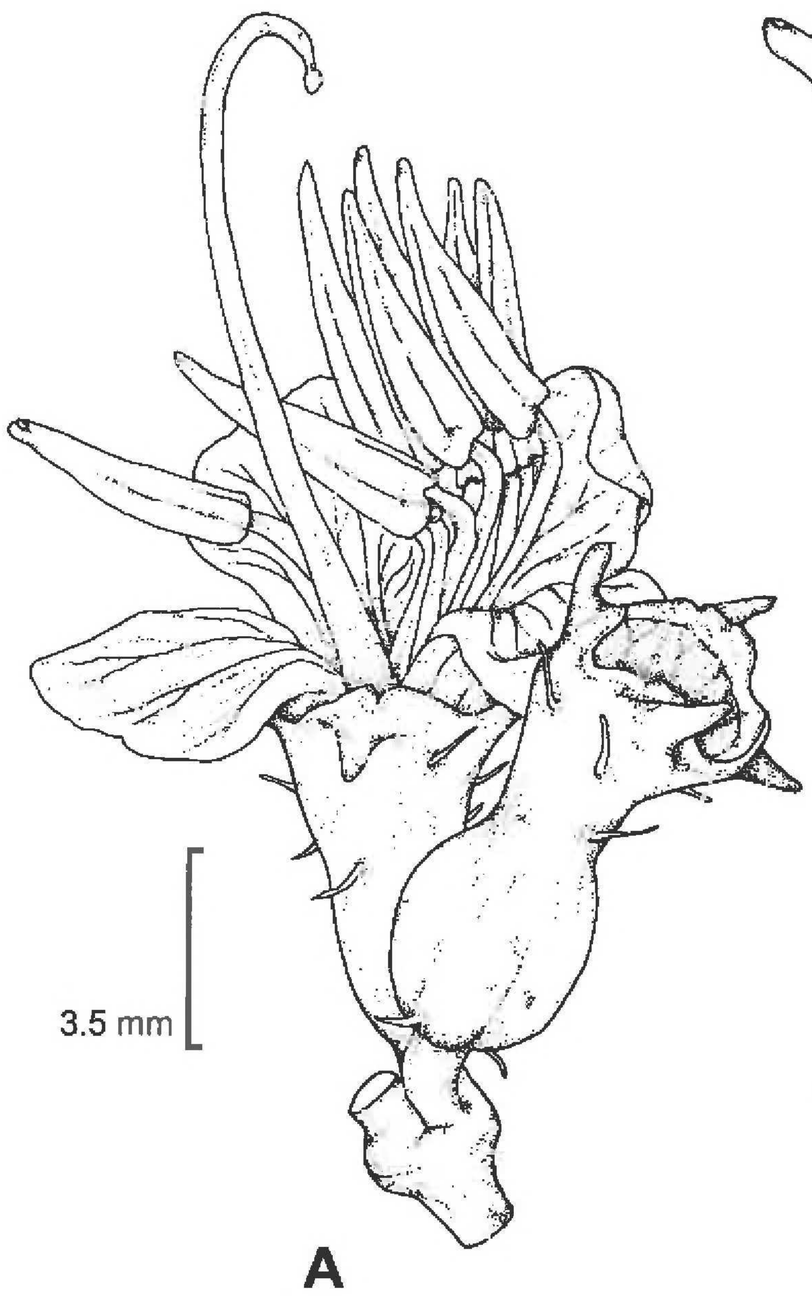
During the course of fieldwork conducted in connection with the study of the systematics of Miconieae (Melastomataceae), herbarium material of a distinctive species was collected in the Sierra Martin Garcia (by W.S. Judd, in 1992 and 2006) and Sierra de Baoruco (by T. Clase, in 2001). It is now evident that these collections represent an undescribed species of *Tetrazygia* (Miconieae, Melastomataceae), which appears to be closely related to *T. longicollis* Urb. & Cogn. and *T. elaeagnoides* (Sw.) DC. These plants are described here, provided with the name *T. paralongicollis*, and compared morphologically with the above mentioned species.

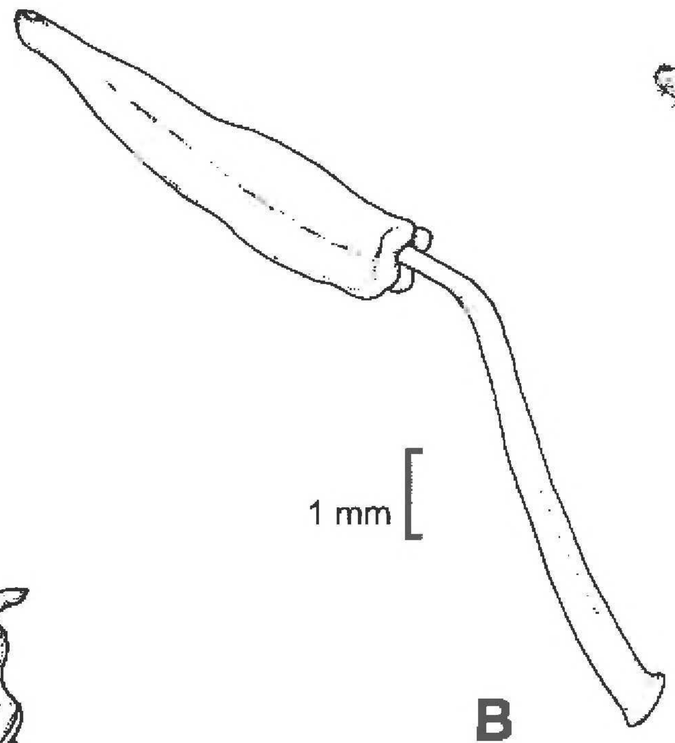
Recent molecular-based phylogenetic analyses (F. Michelangeli, R. Goldenberg, W. Judd, and others; unpublished data) indicate that *Tetrazygia*, a genus of ca. 20 species (Judd & Skean 1991; Liogier 2000), is not monophyletic as traditionally circumscribed. The species of *Tetrazygia* Rich. are intermixed in preliminary cladograms with members of several other genera of Miconieae, especially *Pachyanthus* A. Rich. and *Calycogonium* DC., two genera that are predominantly Antillean in distribution, as is *Tetrazygia*. Clarification of generic limits within this subclade of the Miconieae, i.e., an Antillean complex (see Michelangeli et al. 2004, 2008) is beyond the scope of this paper, but we note that *T. elaeagnoides*, which has 4-merous flowers (as does *T. longicollis* and the species described herein), in preliminary cladistic analyses does not appear to be closely related to the species with 5- or 6-merous flowers, such as *T. bicolor* (Mill.) Cogn., *T. coriacea* Urb., and *T. lanceolata* Urb.

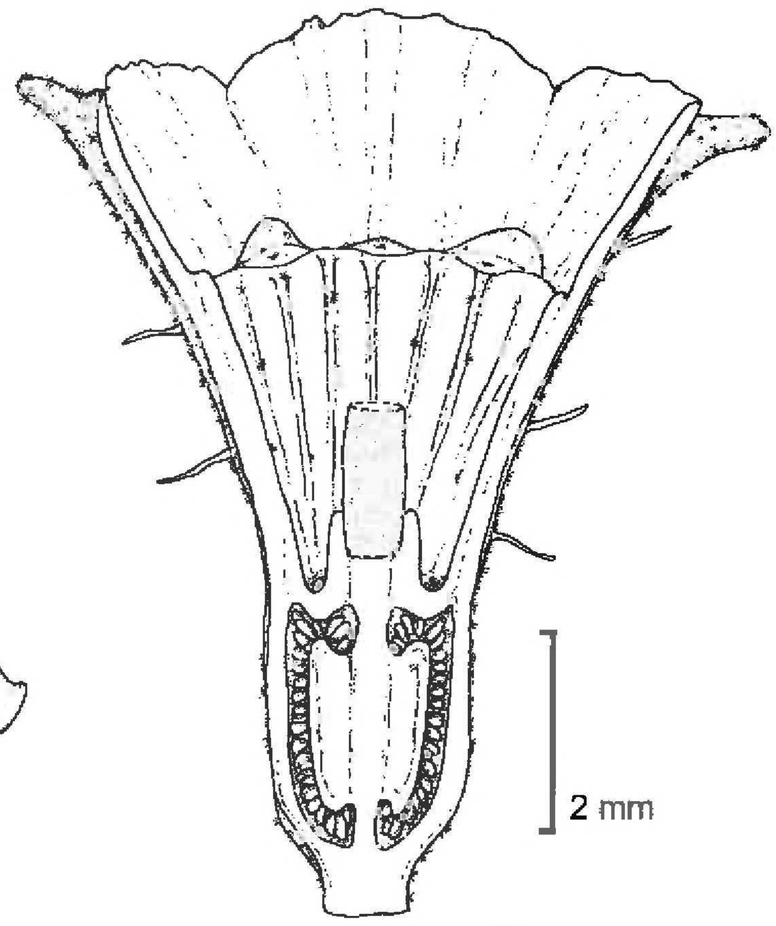
Tetrazygia paralongicollis Judd, Ionta, Clase & Skean, sp. nov. (**Fig. 1**). TYPE: DOMINICAN REPUBLIC. PEDERNALES PROV.: Sierra de Bahoruco, 18 km al Este de Cabo Rojo, en la carretera hacia Aceitillar, bosque de transición con *Pinus occidentalis*. Lat. 71° 37' 63" W, Long. 18° 6' 7" N, 720 m, 19 Jul 2001 (fl, fr), *T. Clase & P. Delprete 3035* (HOLOTYPE: JBSD; ISOTYPES: FLAS, NY, S).

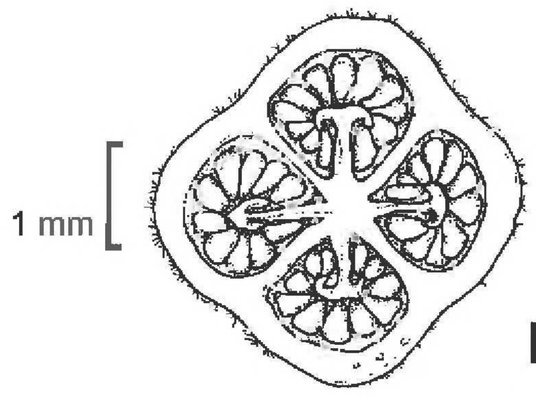
Species haec ab *Tetrazygia longicollis* Urb. & Cogn. differt trichomatibus globosis-stellatis (vs. trichomatibus complanatis-stellatis), veins tertiariis plerumque per veins quaternariis connexis (vs. plerumque per veniis composite-intertertiariis separatis), et calyce lobis externis ca. 1.2 mm longis (vs. 1–5 mm longis).

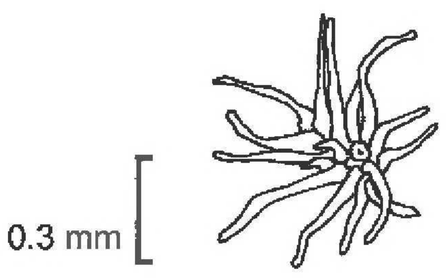
Shrub or small tree to 6 m tall, with gray, horizontally furrowed bark; lateral branches arising from the main trunk ± horizontally, then arching upward. Indumentum of multicellular, pale-ferrugineous, nearly sessile to long-stalked, globular-stellate hairs, and often also simple, elongate multiseriate hairs 0.6 to 1.4 mm long, these sometimes with minute antrorse bristles. Young twigs 2–5 mm wide, slightly quadrangular, with the interpetiolar face (in relation to the distally adjacent node) slightly concave, the adjacent sides slightly convex, becoming terete with age, with moderate to dense globular-stellate hairs and often sparse simple, elongate multiseriate hairs, many breaking off with age; internodes 1.1–6.1 cm long (to 8.5 cm in vigorously growing vegetative shoots). Leaves with petiole 6–9.4 mm long, (but to 28 mm in leaves of vigorously growing vegetative shoots), with dense globular-stellate hairs; blade 2.5–6.8(–20.4) cm long, 0.6–2.2(–7.7) cm wide, 3.1–4.2 (2–3.5 in leaves of vigorously growing sucker-shoots) times longer than wide, ovate to elliptic, flat, coriaceous, the apex acute to acuminate, with the tip of the leaf with upturned margins, forming a mucro 0.5–1.1(–6) mm long with adaxial pocket, the base narrowly acute to cuneate or slightly cordate, the margin plane to slightly revolute, nearly entire, i.e., with only a very few teeth along distal portion of blade, and these at most 0.1 mm long, to ± clearly serrulate or ciliate-serrulate, with teeth 0.1–0.3 mm long, sometimes associated with a short multiseriate hair, ± evenly spaced along margin; venation acrodromous, basal to suprabasal, with prominent midvein and 4 secondary veins (6 in leaves of rapidly growing vegetative shoots), 2 conspicuous secondary veins positioned 1.7–4(–16 in sucker-shoot leaves) mm from margin, and 2 inconspicuous secondary veins closer to margin (but sucker-shoot leaves with an additional pair of inconspicuous, ± intramarginal, secondary veins), numerous percurrent tertiary veins oriented subperpendicular to midvein, the tertiary veins occasionally separated by composite-intertertiary veins (but such veins more common on leaves of sucker-shoots), the higher-order veins reticulate; adaxial surface green, initially with numerous globular-stellate hairs, but quickly glabrescent, the midvein and major secondary veins moderately impressed, minor secondary and tertiary veins slightly impressed to flat, and higher order veins flat, the surface appearing minutely papillose after drying due to presence of numerous subglobose subcuticular druse crystals; abaxial surface light green, with dense pale ferrugineous, globular-stellate hairs obscuring the epidermal surface, and sometimes also elongate, multiseriate hairs, some stellate hairs on the major veins darker ferrugineous, the midvein prominently raised, major secondary veins moderately raised, minor secondary veins, tertiary veins, and some composite-intertertiary veins slightly raised, and higher-order veins flat (or very slightly raised in some leaves of sucker-shoots). Inflorescences 3- to 12-flowered pyramidal cymes of 1 to 2 branch-pairs, 4–7.5 cm long, 1.7–5 cm in diameter; proximal segment of lowermost inflorescence branches 1.4–2.5 cm long, distal internodes of inflorescence branches increasingly shorter, ultimate branches 1.1–1.9 cm long, and flowers appearing in 1- to 3-flowered dichasia, with dense globular-stellate hairs and sparse elongate multiseriate hairs; peduncle 0.5–2.1 cm long, with similar indumentum; proximal inflorescence branch associated with pair of persistent leaflike bracts, 2.5–4.3 cm long, 0.7–1.2 cm wide, similar in form to vegetative leaves, other inflorescence branches associated with pair of caducous bracts (and not present on specimens examined). Flowers perfect, zygomorphic (due to androecium form), with pedicel 1.4–1.5 mm long, the indumentum similar to that of inflorescence branches. Free portion of hypanthium slightly constricted above ovary, flaring and funnelform distal to the constriction, 2.9–3.8 mm long, outer surface with dense to moderate globular-stellate hairs and sparse elongate multiseriate hairs, the inner surface slightly 16-ridged, glabrous except for occasional minute-globular hairs on the ridges. External calyx lobes 4, ca. 1.2 mm long, ca. 0.8 mm wide, narrowly triangular, with acute apex, and terete in cross section, with dense globular-stellate hairs; internal calyx lobes 4, 0.6–0.8 mm long, 2.9–3.4 mm wide, broadly triangular, apex rounded, green to red-tinged, with dense globular-stellate hairs abaxially, glabrous adaxially, the margin membranaceous, minutely erose; calyx tube ca. 1.5 mm long. Petals 4, imbricate in bud, ± asymmetrical, ovate-obovate, 5.2–6.1 mm long, 4.3–4.9 mm wide, glabrous, white; apex rounded; margin entire. Stamens 8, anther elongate-ovate, 4.6–5.2 mm long, glabrous, pale yellow, very

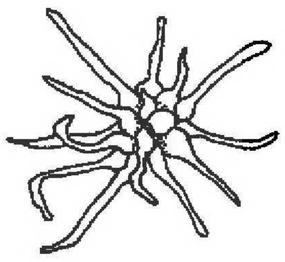


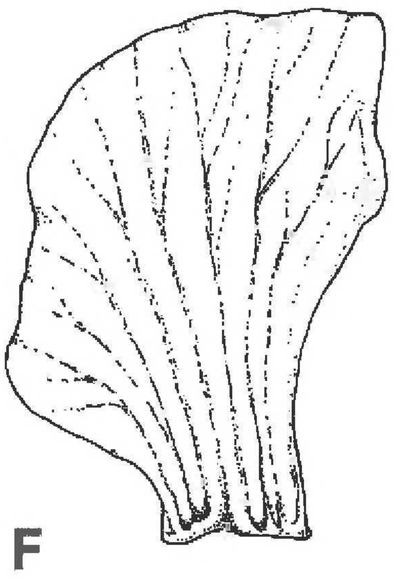


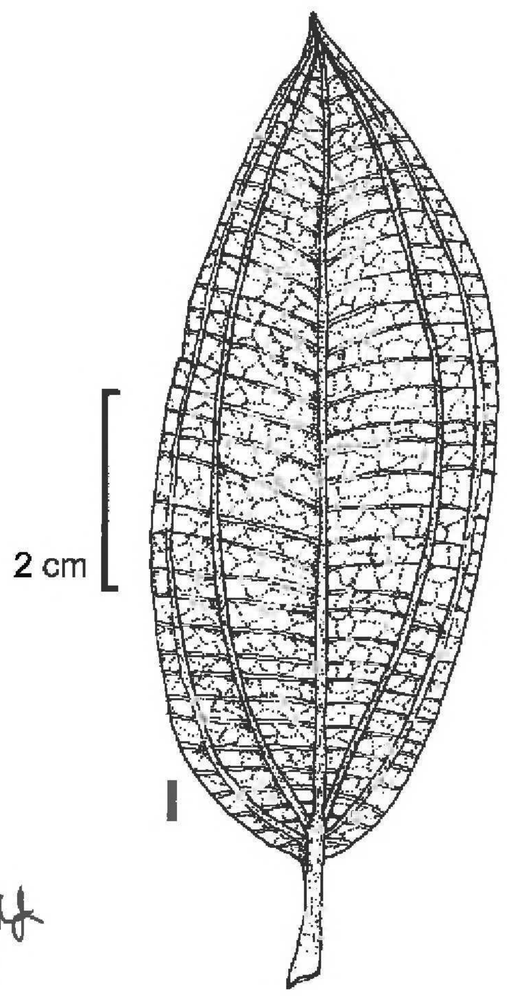












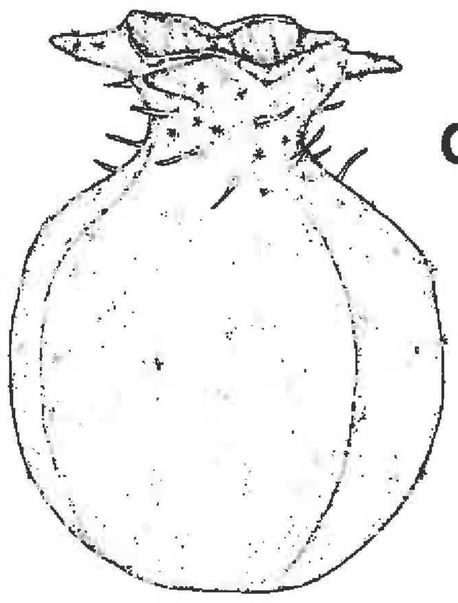


Fig. 1. A–I. *Tetrazygia paralongicollis*. A. Dichasium, with one flower removed. B. Stamen. C. Ovary and hypanthium, in longitudinal section. D. Stellate hairs, from abaxial leaf surface. E. Ovary, in cross-section. F. Petal. G. Berry. H. Habit. I. Leaf, abaxial surface. (All illustrations drawn from holotype, except for "I" which is from *Judd 8148* (FLAS)).

slightly sagittate at base, fertile the entire length, and opening by a single dorso-apical pore, the filament terete, 5.8–6 mm long, glabrous, white. Ovary 4-loculate, ca. 4/5 inferior, ellipsoidal and slightly 4-lobed, 3.5–3.9 mm long, 2.1–2.5 mm wide, with cylindrical apical crown ca. 0.7 mm long encircling base of style, the crown slightly 8-ridged, with sparse stellate hairs and elongate-uniseriate hairs at apex; style ca. 15 mm long, terete, glabrous. Placentation axile with placentas inserted into locules with narrowed longitudinal placental stalk with flattened ellipsoid distal portion, T-shaped in cross-section; ovules numerous. Nearly mature berries 9–12 mm in diameter, globose-ellipsoid, with strongly constricted persistent hypanthium, green when immature, but probably turning purple-black at maturity, with sparse globular-stellate hairs. Seeds angular-obovoid, 0.7–0.9 mm long; testa ± smooth.

Distribution and habitat.—*Tetrazygia paralongicollis* is restricted to the southern part of the Dominican Republic where it has been collected only in the Sierra de Baoruco and Sierra Martin Garcia (Fig. 2), from 720–860 m. In the Sierra de Baoruco it occurs in *Pinus occidentalis* Sw. forests, while in the Sierra Martin Garcia it grows in moist montane forest (on limestone). In the Sierra Martin Garcia, associated melastomes include *Calycogonium hispidulum* Cogn., *Miconia laevigata* (L.) DC., *Sagraea fuertesii* (Cogn.) Alain, *Tetrazygia elaeagnoides* (Sw.) DC., and *T. longicollis* Urb. & Cogn.

Etymology.—The specific epithet highlights the purported close relationship of this species with *Tetrazygia longicollis*, especially as evidenced in the characteristics of its flowers and fruits.

Vegetative anatomy.—Stem, leaf, and petiole anatomy were assessed in material of *Tetrazygia paralongicollis*, i.e., *Judd 8148* (FLAS) and *Clase & Delprete 3035* (FLAS), and leaf and petiole anatomy were assessed in material of *T. longicollis*, i.e., *Judd 6656* (FLAS) and *T. elaeagnoides*, i.e., *Judd 6553* (FLAS) using the phloroglucinol-hydrochloric acid technique outlined by Howard (1974). As is typical of Melastomataceae, the stems of *T. paralongicollis* have a ring of xylem with phloem positioned both externally and internally (amphiphloic), and as characteristic of Miconieae, medullary vascular bundles are present. The pith is lignified, and perivascular fibers are lacking, but there are scattered lignified idioblasts in the inner portion of the cortex, which may have a protective function (because they surround the stele). Druses also are present in the cortex. The nodes are unilacunar/unifascicular, but the vascular bundle divides within the petiole base, forming several bundles in the petiole. The petioles (sectioned at their midpoint) of all three species exhibit a U-shaped pattern composed of 7 to 11 vascular bundles, with the individual bundles composed of xylem surrounded by phloem. The ground parenchyma is unlignified, but in *T. paralongicollis* there are a few scattered lignified idioblasts, and in *T. longicollis* there are numerous lignified idioblasts. The petioles of *T. elaeagnoides* lack lignified idioblasts, but have abundant druse crystals; the parenchyma is literally packed with druses. In contrast, the parenchyma of *T. paralongicollis* and *T. longicollis* has only scattered druse crystals. The leaves of all three species have dorsoventral blades with an epidermis, palisade and spongy mesophyll; the midvein has several vascular bundles, which are more or less arranged in a ring. Lignified idioblasts are present in the parenchyma associated with the midvein vascular bundles of *T. paralongicollis* and *T. longicollis*, while these cells are lacking in *T. elaeagnoides*. The abaxial leaf surface of all three species is covered with a thick layer of stellate hairs, which are variably lignified. As with the petiole, the parenchyma of the midvein of *T. elaeagnoides* contains very abundant druses. Druses are present in the lamina of all three species, with these crystals placed below the epidermis in either the palisade or spongy mesophyll.

Additional collections. **DOMINICAN REPUBLIC. Azua Prov.:** Sierra Martin Garcia, Loma del Aguacate, hills and ridge of mountain west of Barreras, ca. 850–860 m, plants collected along trail from Barreras to El Copey, 17 May 1992 (sterile), *Judd 6552* (FLAS, JBSD); Sierra Martin Garcia, hills and ridges of mountain SW of Barreras, along trail from Barrera toward El Copey (from N side of town, trail starts to NNW, cuts W, then SW, then S, then more or less W, with variance); near Barahona, 810–820 m. Lat. 18° 19' 4.4" N, Long. 70° 56' 47.2" W, Datum: WGS84, 6 Jun 2006 (sterile), *Judd 8147* (FLAS, JBSD, MICH, MO, MSC, NY, S, US)

DISCUSSION

Tetrazygia paralongicollis is most similar to *T. longicollis* (incl. *T. brevicollis* Leonard). This is especially seen in the form of its flowers and fruits, i.e., 4-merous, with conical-terete external calyx lobes, broadly triangular internal calyx lobes, ovate-obovate, white petals, stamens with ovate-elongate anthers, an ellipsoidal

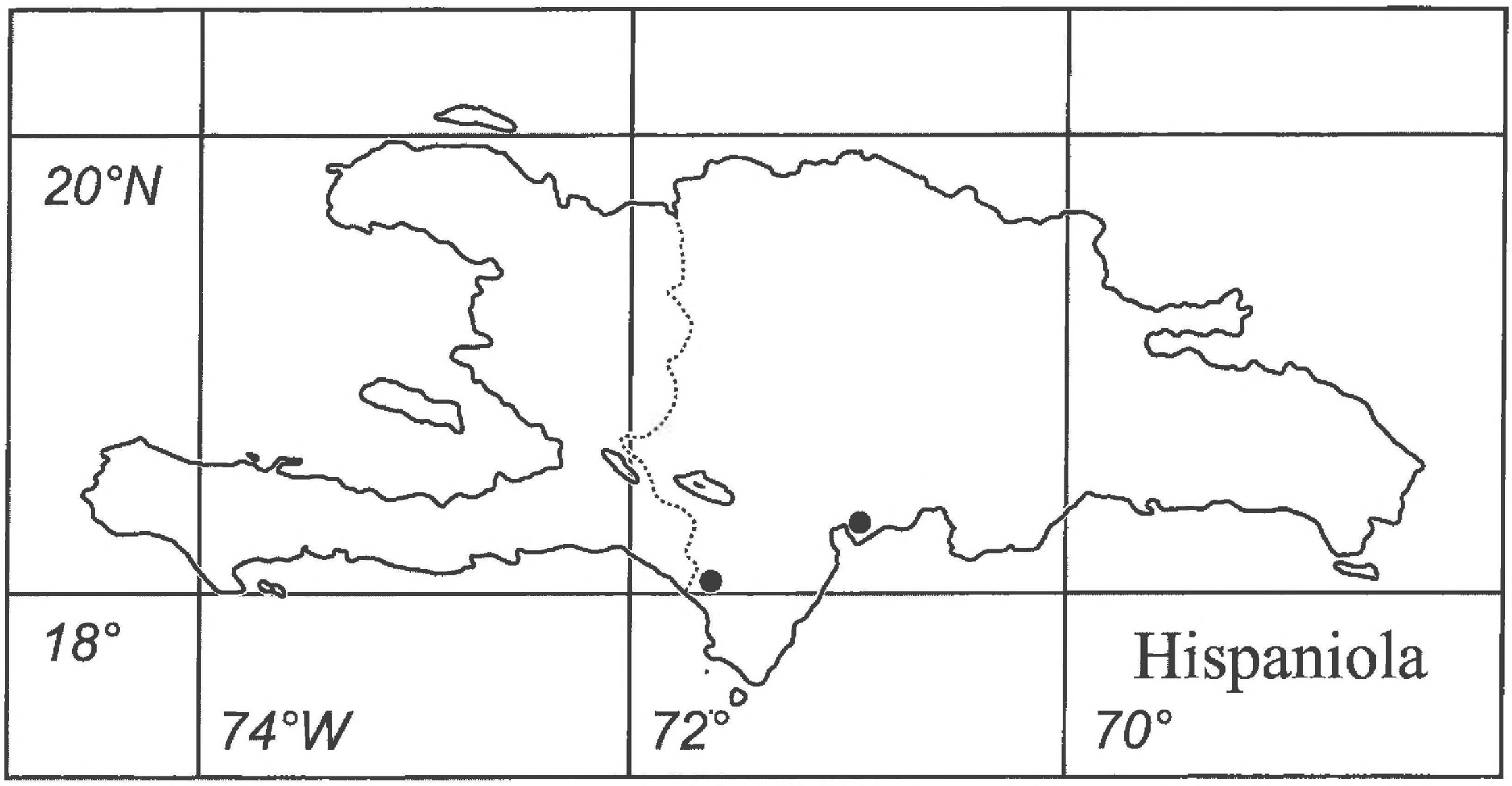


Fig. 2. Distribution of *Tetrazygia paralongicollis* (dots).

ovary (only slightly 4-lobed) and with the placentas inserted into locules, T-shaped in cross section, and globose-ellipsoid berries with strongly constricted hypanthium. However, it is consistently differentiated from *T. longicollis* by its globose-stellate hairs, i.e., with branches radiating in all directions from a globose central region (vs. flattened-stellate hairs, i.e., with branches more or less radiating outward from a central region), the tertiary veins usually connected by reticulate quaternary veins, i.e., only occasionally separated by composite-intertertiary veins (vs. tertiary veins usually separated by composite-intertertiary veins, thus making the leaf "tertiary" veins appear to be closer together than they actually are), and external calyx lobes that are ca. 1.2 mm long (vs. variable in length, ca. 1–5 mm long). *Tetrazygia paralongicollis* is also quite similar to *T. elaeagnoides*, especially in the morphology of its stellate hairs and in the pattern of venation of its leaves. *Tetrazygia paralongicollis* is easily distinguished from this species by its hypanthia (and fruits), which are globose-ellipsoid and only very slightly 4-lobed when in flower, becoming unlobed in fruit (vs. subglobose and strongly 4-angled), placental form, i.e., the placenta extended into the locule and T-shaped in cross-section (vs. elliptic in cross-section), and the presence of lignified idioblasts in the parenchyma of the petioles (vs. lignified idioblasts lacking). In addition, many plants of *T. elaeagnoides* have shorter external calyx lobes, e.g., ca. 0.2–0.4 mm long, but in some plants they may be as long as 1.6 mm. Plants of *T. paralongicollis* from the type locality differ from both of these species in having simple, elongate, multiseriate hairs intermixed with the globular-stellate hairs on their stems, abaxial leaf surface, leaf margin (in association with the teeth), inflorescence axes, and hypanthium. The plants of the Sierra Martin Garcia, however, lack these hairs, but these plants (unfortunately, only collected in sterile condition) are considered within *T. paralongicollis* because their leaf shape, venation, and stellate-hair morphology closely match that of the type specimens. It is noteworthy that the leaves of the Sierra Martin Garcia population are frequently larger than those of either *T. longicollis* or *T. elaeagnoides*. This new species occurs with both *T. longicollis* and *T. elaeagnoides* in the Sierra Martin Garcia, but no intermediate plants were seen in that region. Only *T. longicollis*, however, is known from the Sierra de Baoruco, in the vicinity of the type locality.

Tetrazygia paralongicollis, exhibiting a distinctive combination of morphological characters, satisfies the expectations of the morphological-phenetic (Judd 2007) and diagnostic (Wheeler & Platnick 2000) species concepts.

The description of *Tetrazygia paralongicollis* brings the number of species of *Tetrazygia* known from

Hispaniola to eight (Liogier 2000), given that we consider *T. urbaniana* (Cogn.) Croizat ex Moscoso to be a synonym of the morphologically variable *T. tuerckheimii* (Cogn.) Ekman & Urb. All the other species of *Tetrazygia* show fairly broad geographical distributions on the island compared to *T. paralongicollis*.

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